

AMENDMENTS TO THE CLAIMS

1. (Currently amended) A method for depositing a release agent on a surface of a workpiece, comprising steps for:

providing a workpiece having a desired feature to be coated with a suitable release agent;
providing a solution comprising the [[mold]] release agent and water, wherein the workpiece can be placed within said solution; and

providing ultrasonic energy to the solution, said workpiece being exposed to said energy at a suitable power level and for a suitable time to provide the feature with a film containing the release agent.

2. (Previously presented) The method of Claim 1, wherein the workpiece feature comprises a metal oxide.

3. (Previously presented) The method of Claim 2, wherein the metal oxide is selected from the group consisting of TiO_2 , TiO , Ti_2O_3 , Ti_3O_5 , SnO , SnO_2 , Al_2O_3 , Al_2O , AlO , Ta_2O_5 , ZrO_2 , HfO_2 , Y_2O_3 , Nb_2O_4 , Nb_2O_5 , NiO , MgO , MgO_2 , Fe_2O_3 , Fe_3O_4 , FeOOH , $\text{Fe}(\text{OH})_2$, Cr_2O_3 , CrO_2 , and CrO_3 , or any combination thereof.

4. (Previously presented) The method of Claim 3, wherein the metal oxide is Al_2O_3 .

5. (Previously presented) The method of Claim 3, wherein the metal oxide is NiO .

6. (Previously presented) The method of Claim 3, wherein the metal oxide is MgO .

7. (Previously presented) The method of Claim 3, wherein the metal oxide is SnO_2 .

8. (Previously presented) The method of Claim 1, wherein the workpiece comprises aluminum.

9. (Previously presented) The method Claim 8, wherein the workpiece comprises once-anodized aluminum.

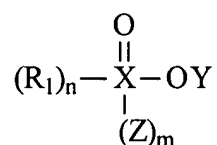
10. (Previously presented) The method of Claim 1, wherein the workpiece comprises a metal oxide coating.
11. (Previously presented) The method of Claim 10, wherein the coating exhibits an isoelectric point greater than about 2.
12. (Previously presented) The method of Claim 10, wherein the metal oxide exhibits an isoelectric point greater than or about equal to 4.
13. (Previously presented) The method of Claim 10, wherein the metal oxide exhibits an isoelectric point greater than or about equal to 8.
14. (Previously presented) The method of Claim 10, wherein the metal oxide exhibits an isoelectric point greater than or about equal to 10.
15. (Previously presented) The method of Claim 10, wherein the metal oxide exhibits an isoelectric point less than or about equal to 12.
16. (Previously presented) The method of Claim 10, wherein the metal oxide exhibits an isoelectric point from about 7 to about 12.5.
17. (Previously presented) The method of Claim 16, wherein the metal oxide is selected from the group consisting of Fe_2O_3 , Fe_3O_4 , FeOOH , and $\text{Fe}(\text{OH})_2$, or any combination thereof.
18. (Previously presented) The method of Claim 10, wherein the metal oxide exhibits an isoelectric point from about 6 to about 7.
19. (Previously presented) The method of Claim 18, wherein the metal oxide is selected from the group consisting of CrO_3 , CrO_2 , and Cr_2O_3 , or any combination thereof.
20. (Previously presented) The method of Claim 1, wherein the solution comprises water, alcohol and a release agent.

21. (Previously presented) The method of Claim 20, wherein the release agent comprises up to 1% of the solution.

22. (Previously presented) The method of Claim 1, wherein the release agent is an anionic compound.

23. Previously presented) The method of Claim 1, wherein the release agent comprises fluorine.

24. (Previously presented) The method of Claim 1, wherein the release agent is a compound with the following general formula:



wherein,

Y is any element or combination of elements that forms an acid conjugate upon dissociation,

X is any element that facilitates the dissociation and formation of a base conjugate with reduced chemical interaction with the resin mixture,

R₁ is any combination of elements that provides a non-reactive barrier film on the workpiece surface,

n is either 1 or 2,

Z is either O or OH,

m is either 0 or 1.

25. (Previously presented) The method of Claim 24, wherein,

Y is H, NH₄, or NR₄, wherein R is any aliphatic hydrocarbon chain,

X is P, S, or C,

R₁ is any alkyl, alkyl ester, or fluorinated alkyl esters, R₁ having from 8 to 20 carbon units,

n is 1 when X is C or S or when X is P and the compound describes phosphonic acid or di-acid phosphate esters, n is 2 when X is P and the compound describes phosphinic acid or mono-acid phosphate esters,

Z is O when X is S and the compound describes sulfonic acids, Z is OH when X is P and the compound describes di-acid phosphate esters or phosphonic acids, and m is 1,

m is 0 when X is C or X is P and the compound describes mono-acid phosphates or phosphinic acid.

26. (Previously presented) The method of Claim 1, wherein the release agent is an ester or acid selected from the group consisting of phosphates, phosphonates, phosphonites, sulfates, sulfites and carboxylates.

27. (Previously presented) The method of Claim 1, wherein the frequency of ultrasonic energy is up to about 40 kHz.

28. (Previously presented) The method of Claim 1, wherein the source of ultrasonic energy is provided either internally or externally to the solution.

29. (Previously presented) The method of Claim 1, wherein the source of ultrasonic energy is rastered over the workpiece.

30. (Previously presented) The method of Claim 1, further comprising a step for drying the workpiece, comprising subjecting the workpiece to a temperature of about 80 to about 120 degrees centigrade for a time period up to about 4 hours.

31. (Previously presented) The method of Claim 1, further comprising a step for: providing a transport gas into the solution.

32. (Previously presented) The method of Claim 31, wherein the gas is selected from the group consisting of air, nitrogen, oxygen, argon, CF₄, alkanes or any combination thereof.

33-61. (Canceled)

62. (New) A method for depositing a release agent on a surface of a workpiece, comprising placing the workpiece in an aqueous solution containing a release agent and applying ultrasonic energy to generate bubbles in the solution to transport the release agent to the surface of the workpiece to coat the release agent to the workpiece surface.

63. (New) The method of Claim 62, wherein the workpiece comprises a metal oxide surface.

64. (New) The method of Claim 63, wherein the metal oxide is selected from the group consisting of TiO₂, TiO, Ti₂O₃, Ti₃O₅, SnO, SnO₂, Al₂O₃, Al₂O, AlO, Ta₂O₅, ZrO₂, HfO₂, Y₂O₃, Nb₂O₄, Nb₂O₅, NiO, MgO, MgO₂, Fe₂O₃, Fe₃O₄, FeOOH, Fe(OH)₂, Cr₂O₃, CrO₂, and CrO₃, or any combination thereof.

65. (New) The method of Claim 64, wherein the metal oxide is Al₂O₃.

66. (New) The method of Claim 64, wherein the metal oxide is NiO.

67. (New) The method of Claim 64, wherein the metal oxide is MgO.

68. (New) The method of Claim 64, wherein the metal oxide is SnO₂.

69. (New) The method of Claim 62, wherein the workpiece comprises aluminum.

70. (New) The method Claim 69, wherein the workpiece comprises once-anodized aluminum.

71. (New) The method of Claim 62, wherein the workpiece comprises a metal oxide coating.

72. (New) The method of Claim 71, wherein the coating exhibits an isoelectric point greater than about 2.

73. (New) The method of Claim 71, wherein the metal oxide exhibits an isoelectric point greater than or about equal to 4.

74. (New) The method of Claim 71, wherein the metal oxide exhibits an isoelectric point greater than or about equal to 8.

75. (New) The method of Claim 71, wherein the metal oxide exhibits an isoelectric point greater than or about equal to 10.

76. (New) The method of Claim 71, wherein the metal oxide exhibits an isoelectric point less than or about equal to 12.

77. (New) The method of Claim 71, wherein the metal oxide exhibits an isoelectric point from about 7 to about 12.5.

78. (New) The method of Claim 77, wherein the metal oxide is selected from the group consisting of Fe_2O_3 , Fe_3O_4 , FeOOH , and $\text{Fe}(\text{OH})_2$, or any combination thereof.

79. (New) The method of Claim 71, wherein the metal oxide exhibits an isoelectric point from about 6 to about 7.

80. (New) The method of Claim 79, wherein the metal oxide is selected from the group consisting of CrO_3 , CrO_2 , and Cr_2O_3 , or any combination thereof.

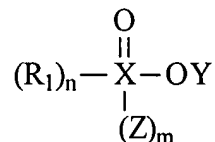
81. (New) The method of Claim 62, wherein the solution comprises water, alcohol and a release agent.

82. (New) The method of Claim 81, wherein the release agent comprises up to 1% of the solution.

83. (New) The method of Claim 62, wherein the release agent is an anionic compound.

84. (New) The method of Claim 62, wherein the release agent comprises fluorine.

85. (New) The method of Claim 62, wherein the release agent is a compound with the following general formula:



wherein,

Y is any element or combination of elements that forms an acid conjugate upon dissociation,

X is any element that facilitates the dissociation and formation of a base conjugate with reduced chemical interaction with the resin mixture,

R₁ is any combination of elements that provides a non-reactive barrier film on the workpiece surface,

n is either 1 or 2,

Z is either O or OH,

m is either 0 or 1.

— 86. (New) The method of Claim 85, wherein,

Y is H, NH₄, or NR₄, wherein R is any aliphatic hydrocarbon chain,

X is P, S, or C,

R₁ is any alkyl, alkyl ester, or fluorinated alkyl esters, R₁ having from 8 to 20 carbon units,

n is 1 when X is C or S or when X is P and the compound describes phosphonic acid or di-acid phosphate esters, n is 2 when X is P and the compound describes phosphinic acid or mono-acid phosphate esters,

Z is O when X is S and the compound describes sulfonic acids, Z is OH when X is P and the compound describes di-acid phosphate esters or phosphonic acids, and m is 1,

m is 0 when X is C or X is P and the compound describes mono-acid phosphates or phosphinic acid.

87. (New) The method of Claim 62, wherein the release agent is an ester or acid selected from the group consisting of phosphates, phosphonates, phosphonites, sulfates, sulfites and carboxylates.

88. (New) The method of Claim 62, wherein the frequency of ultrasonic energy is up to about 40 kHz.

89. (New) The method of Claim 62, wherein the source of ultrasonic energy is provided either internally or externally to the solution.

90. (New) The method of Claim 62, wherein the source of ultrasonic energy is rastered over the workpiece.

91. (New) The method of Claim 62, further comprising subjecting the workpiece to a temperature of about 80 to about 120 degrees centigrade for a time period up to about 4 hours.

92. (New) The method of Claim 62, further comprising providing a transport gas into the solution.

93. (New) The method of Claim 31, wherein the gas is selected from the group consisting of air, nitrogen, oxygen, argon, CF₄, alkanes or any combination thereof.

94. (New) A method for depositing a release agent on a surface of a workpiece, comprising:

providing a workpiece having a feature desired to be coated with a release agent;

providing a solution comprising the release agent and water, wherein the workpiece is placed within said solution; and

providing cavitation energy to the solution, said workpiece being exposed to said energy to coat the feature with a film containing the release agent.

95. (New) The method of Claim 94, wherein said cavitation energy is ultrasonic energy.

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